PATENT

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellant:	Wai Ming Choi
Application No.:	10/822,440—Conf. No. 1434
Filed:	April 12, 2004
Entitled:	LOW DENSITY NONWOVEN GLASS FIBER WEB
Docket No.:	H0818.70008US01

Group Art Unit: 1794

Examiner: Andrew T. Piziali

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APPEAL BRIEF PURSUANT TO 37 C.F.R. §41.37

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I. REAL PARTY IN INTEREST

The real party in interest is Hollingsworth & Vose Company. Hollingsworth & Vose Company of East Walpole, Massachusetts derives its rights in this application by virtue of an assignment of the application by the inventors to Hollingsworth & Vose Company as recorded at Reel 015533, Frames 0297-0299.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 1-20 are currently pending in the present application. Claims 21-30 are cancelled. Pending claims 1-20 stand rejected. Accordingly, claims 1-20 are subject to appeal.

IV. STATUS OF AMENDMENTS

No amendments were made subsequent to the final Office Action mailed on May 16, 2008.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 recites a nonwoven filter media that includes at least one glass wool fiber web having a gamma value of at least 14, and a surface area of at least 1.2 m^2/g. Para. [0006]; page 2, lines 10-13. Independent claim 8 recites a nonwoven filter media that includes at least one glass fiber web having a gamma value of at least 14, and an apparent density of at least 0.15 g/cc. *Id.* The gamma value of a filter media is a representation of its performance and is a function of the degree of penetration of particles through the filter and the pressure drop or resistance across the filter. Para. [0031]; page 8, lines 25-32. Higher gamma values are indicative of better filter performance. *Id.*

Nonwoven filter media can be formed from glass fibers using a wet-laid processing technique in which the glass fibers are mixed with water and an acidic dispersing agent for several minutes in a hydropulper to form a slurry. Para. [0025]; page 6, lines 11-29. The slurry can then be pumped into a headbox where the fibers are collected on a screen and dried to form a filter media. *Id.* Various properties of the filter, including its gamma value, surface area, and

apparent density, can be improved by performing one or more intermediate steps in the formation process or by adding additional ingredients to the mixture. Paras. [0019], [0034], [0041], [0042]; page 4, lines 6-20; page 9, line 22 – page 10, line 2; page 12, line 9 – page 14, line 18. Appellants have discovered that, in one embodiment, the gamma value of the filter can be increased by adjusting the pH of the slurry from an initially acidic level to a more alkaline level prior to the collection stage. Para. [0019]; page 4, lines 6-20. An increase in filter surface area can be achieved in a similar fashion, or can alternatively be achieved by adding additional sub-micron fibers to the slurry during the wet laid process. Para. [0032]; page 9, lines 1-15. FIGS. 3-7 of the specification illustrate how various filter properties can be improved by adjusting the slurry pH during the formation process.

Independent claim 13 recites a filter media that includes a support layer and a filtration layer including glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ. Para. [0007]; page 2, lines 19-31. The filter media has a gamma value of at least 14. *Id.* It can be desirable to construct filter media with multiple layers. In one exemplary embodiment, the filter media can include a support layer and one or more filtration layers. Para. [0027]; page 7, lines 5-20. The support layer can be formed from chopped glass fibers having a fiber diameter in the range of about 4μ to 30μ and can be effective to provide structural integrity to the filter media. *Id.* The filtration layer(s) can be formed from a combination of glass wool fibers having a fiber diameter in the range of about 0.1μ to 4.5μ and chopped glass fibers having a fiber diameter in the range of about 4μ to 30μ. *Id.* Both the support layer and the filtration layer can be formed using a wet-laid process. *Id.*

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether the Examiner improperly rejected claims 1-20 pursuant to 35 U.S.C. §112, first paragraph, as being "based on a disclosure which is not fully enabling because essential matter is not recited in the claims."

B. Whether the Examiner improperly rejected claims 13-14 and 19-20 pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Publication Number WO 01/43850 to Pierce ("Pierce") in view of U.S. Patent No. 6,291,552 to Dong ("Dong").

C. Whether the Examiner improperly rejected claims 16-17 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong and further in view of U.S. Patent No. 4,102,785 to Head ("Head").

D. Whether the Examiner improperly rejected claim 18 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong and further in view of U.S. Patent No. 6,749,753 to Yamaguchi ("Yamaguchi").

E. Whether the Examiner improperly rejected claims 1-17 and 19-20 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong and further in view of U.S. Patent No. 6,420,024 to Perez ("Perez").

F. Whether the Examiner improperly rejected claim 18 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong in view of Perez and further in view of Yamaguchi.

G. Whether the Examiner improperly rejected claims 8-12 and 16-17 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong in view of Perez and further in view of Head.

VII. ARGUMENT

A. THE REJECTION OF CLAIMS 1-20 PURSUANT TO 35 U.S.C. §112, FIRST PARAGRAPH, SHOULD BE REVERSED

1. The Examiner's Rejection

Claims 1-20 are rejected pursuant to 35 U.S.C. §112, first paragraph, as being based on a disclosure that is not fully enabling because essential matter is not recited in the claims. Independent claims 1, 8, and 13 each recite, in relevant part, a glass fiber web (claims 1 and 8) or a filter media (claim 13) having a gamma value of at least 14. Relying on *In Re Mayhew*, 527 F.2d 1229 (C.C.P.A. 1976), the Examiner argues that "Applicant's arguments and submitted declaration clearly teach that forming the nonwoven by a wet laid processing technique comprising the addition of an acidic agent followed by the addition of a neutral or alkaline adjusting agent is critical or essential to the practice of the invention, but it is not included in the claims." *Office Action dated 5/16/2008* at 2. In other words, the Examiner asserts that the

disclosed process of adjusting the pH is critical to achieving the claimed gamma value of at least 14.

2. Adjusting The pH Is Not A Critical Feature

First, the disclosed process of adjusting the pH is not a critical feature of the invention defined by claims 1, 8, and 13. Rather, it is merely one embodiment of a process for obtaining the claimed gamma value. MPEP §2164.08(c) states:

> "[A]n enablement rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made *only* when the language of the specification makes it clear that the limitation is *critical* for the invention to function as intended. Broad language in the disclosure, including the abstract, omitting an allegedly critical feature, tends to rebut the argument of criticality."

(Emphasis added). Appellants' specification goes beyond providing broad language to rebut criticality and instead provides express teachings that adjusting the pH is not essential. Appellants disclose three different examples in the specification, each of which obtained a filter media having a gamma value of at least 14. *Specification* at Examples 1-3.

Yet, Example 2 demonstrates that gamma values of at least 14 are attainable without adjusting the pH. In Example 2, gamma values of 16.24 and 16.79 are achieved when a fiber mixture starts out in the hydropulper with a pH of about 9, and then is maintained at a pH of 9 in the headbox. *Specification* at para. [0041]; Table 2. Thus, this second example illustrates a process for making the claimed filter media that does not rely on adjusting the pH from an acidic pH to an alkali pH, as argued to be critical by the Examiner. *See Id.*[1]

[1] During prosecution, one of the arguments maintained by Appellants to overcome a rejection pursuant to 35 U.S.C. §103(a) over Pierce and Dong was that Dong does not remedy the deficiencies of Pierce because Dong fails to teach adding an acid before adding a base. In response to this argument, the Examiner argued that the "current specification fails to teach or suggest that the pH value must be adjusted to obtain the claimed gamma value." *Office Action dated 9/13/2006* at 16. This created an exchange of arguments, including the submission of a first Declaration of Wai Ming Choi dated March 7, 2007 ("the Choi I Declaration," attached hereto in Appendix B as Exhibit A) and a second Declaration of Wai Ming Choi dated October 4, 2007 ("the Choi II Declaration," attached hereto in Appendix B as Exhibit B), that focused on one of the embodiments of the invention. While the arguments admittedly appear to indicate that adjusting the pH is critical, that is not the case, as can be readily seen by examining Example 2 of the application. The pending claims continue to distinguish over Pierce and Dong for numerous reasons as discussed herein.

Appellants' declaration offers additional proof that the claimed gamma value can be reached in a variety of ways. In a Declaration of Wai Ming Choi dated October 4, 2007 ("the Choi II Declaration," attached hereto in Appendix B as Exhibit B), several experiments are detailed, three of which resulted in gamma values of at least 14.[2] Experiment A, as depicted in Table A, columns A3 and A5 of the Choi II Declaration, show that a gamma value of at least 14 can be obtained without modifying the pH at all. Similarly, Table C, columns C1, C2, and C6 of the declaration show that Experiment C was successful in obtaining a gamma value of at least 14 by only adding a base. Thus, although the declaration shows that the supposedly critical process of adjusting the pH can lead to advantageous gamma values, it also discloses at least two other means of achieving the claimed gamma value. Where the intrinsic record illustrates several means of accomplishing a claimed parameter, no single means can be considered *critical*.

In addition, the facts of the *Mayhew* case are very different from those of the instant case, and therefore the Examiner's reliance thereon is inappropriate. The Court in *Mayhew* found claims directed to a process for producing coated steel strips to be invalid for lack of enablement because they failed to recite a step that the Court considered essential. *Mayhew* at 1233. The invention in Mayhew involved heating a steel strip to approximately 1000 degrees and then passing it through a 900 degree molten bath of zinc spelter. *Id.* at 1230-31. While submerged in the bath, an iron-zinc alloy is formed. *Id.* The strip is then cooled to about 800 to 860 degrees in order to terminate the alloying process before the strip is reintroduced to the ambient air. *Id.* Gas jets are then used to remove any spelter left on the strip, thereby revealing an iron-zinc alloy surface with favorable properties. *Id.* The *Mayhew* specification had contained numerous statements attesting to the criticality of the cooling step in order to avoid "a gritty, uneven,

[2] Appellants note that the statement in paragraph 6 of the Choi II Declaration, stating that "[t]he following examples prove that a gamma value of at least about 14 can only be obtained by [adjusting the pH]" is potentially misleading. To clarify, the steps described are not the *only* way of obtaining a gamma value of 14 – rather, Appellants' specification, as explained above, illustrates at least one example where adjusting the pH is not required, and in fact the very next paragraph of the Choi II Declaration explains how a gamma value of 14.43 can be obtained without adjusting the pH at all. The disclosed process was relied on to prove that the prior art does not inherently disclose the claimed invention, not because it is essential to practicing the invention.

Appellants also note that the Choi I Declaration contains a similar statement at paragraph 7. In that declaration, Example 1 of the specification was reproduced using the same fiber types and quantities but without performing the pH adjusting steps. Thus, the statement in paragraph 7 and the data that follows are meant only to show that the gamma values achieved *with these specific fiber types and quantities* were a result of the pH adjusting steps, not to show that the steps are necessary for *all* fiber types and quantities. Rather, as discussed above, Example 2 of Appellants' specification expressly show otherwise.

unacceptable surface," yet the rejected claims did not recite the cooling step. *Mayhew* at 1232-34. The Court reasoned that, in light of the Appellants' extensive recitations of the criticality of the cooling step, the process claims lacking such a step were not adequately supported. *Id.* at 1233. Here, as explained above, there are no such recitations of criticality in Appellants' specification. To the contrary, at least one alternative mean of achieving the claimed invention are detailed. *Mayhew* is thus inapplicable to the case at bar.

Accordingly, adjusting the pH by first adding an acid and then subsequently adding a base is not essential or critical to obtaining a gamma value of at least 14 and is thus not required to be claimed in order for claims 1, 8, and 13 to be enabled.

3. *Even If Adjusting The pH Was Critical To Producing The Claimed Product, There Is No Requirement To Recite Critical Process Steps In Claims Drawn To A Product*

Even if one could construe the step of adjusting the pH to be critical to the process of making glass fiber webs having a gamma value of at least 14, 35 U.S.C. §112 does not mandate recitation of that step in product claims. *See In Re Priest*, 582 F.2d 33 (C.C.P.A. 1978); *Bayer Ag v. Sony Elecs., Inc.*, 229 F. Supp. 2d 332, 361 (D. Del. 2002), *aff'd per curiam* 83 Fed.Appx. 334 (Fed. Cir. 2003) (finding that claims to a metal powder were not invalid under 35 U.S.C. §112 for failing to recite steps critical to the process for producing the metal powders).

In the *Priest* case, the C.C.P.A. affirmed the Board's reversal of the Examiner's rejection of certain composition claims pursuant to 35 U.S.C. §112. The claims, which were directed to a polymer *composition*, had been rejected for failing to recite *process* limitations the Examiner deemed critical, such as the temperature at which the polymers were formed and the reaction apparatus necessary to produce the polymers. *Priest* at 34-35. The Appellant in *Priest* admitted that the missing limitations were in fact critical to the *process* for making the claimed compositions, but argued that they should not be required in the composition claims themselves. *Id.* at 35. Agreeing with the Appellant, the Board reversed the Examiner and held that:

> "True, an essential process parameter is not recited in the instant product claims, but such is not deemed to be necessary in view of the fact that the characteristic of the product due to the use of such parameter is described in the claims. The claims specifically state that the polymer particles have diameters less than one micron and such is obtained only when operating under particular reaction conditions;

these conditions need thus not be described in the claims, they being a necessarily inferential limitation thereof."

Id. at 36. The Appellant in *Priest* appealed to the C.C.P.A., arguing that the Board was in error in stating that the critical process parameters were an "inferential limitation" of the claims. *Id.* The C.C.P.A. agreed and affirmed the Board's reversal of the Examiner's rejection but reversed the board's action in reading limitations into the claim as a condition of the reversal. *Id.* at 37. Rather, the C.C.P.A. found that "the Examiner's rejection should have been reversed by the board without adding the 'inferential limitations.'" *Priest* at 38.

In *Bayer*, an infringement defendant argued that the plaintiff's asserted product claims to a metal powder suitable for magnetic recording were invalid under 35 U.S.C. §112 for omitting an essential element of the invention. *Bayer* at 337, 360-61. In particular, the defendant argued that the product claims were invalid because they omitted a two-stage reduction process that was described in the specification as being essential to making the claimed powder. *Id.* at 360. The Court disagreed, concluding that the two-stage reduction process was "not directed to the first aspect of the invention, the metal powders claimed in Claims 1-3, but to the second aspect of the invention, the process for producing those metal powders." *Id.* at 360-61. The Court therefore declined to find the product claims invalid under §112. *Id.* The *Bayer* Court thus recognized that 35 U.S.C. §112 does not require critical *process* steps to be recited in claims that are only directed to the *product* made by that process.[3] *See Id.* at 361.

In the instant case, just like in *Priest* and in *Bayer*, the Examiner has rejected product claims (claims drawn to a filter media) for failing to include supposedly essential process parameters (adjusting slurry pH during formation). Just as in *Priest* and *Bayer* then, it is not necessary for Appellants to recite the process parameter of adjusting the pH in their product claims, regardless of whether such adjustment is critical or essential.

In sum, adjusting the slurry pH during formation of the claimed filter media is not critical to achieving a gamma value of at least 14 and therefore claims 1, 8, and 13 do not lack any critical limitations. Moreover, even if the process parameter of adjusting the pH was critical,

[3] *Bayer* was affirmed without opinion pursuant to Fed. Cir. R. 36 in a per curiam decision of the Federal Circuit. *Bayer Ag v. Sony Elecs., Inc.*, 83 Fed. Appx. 334 (Fed. Cir. 2003).

Appellants' claims directed to products are not required to recite such process parameters under *Priest* and *Bayer*. Accordingly, independent claims 1-20 are enabled pursuant to 35 U.S.C. §112.

B. THE REJECTION OF CLAIMS 13-14 AND 19-20 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE AND DONG SHOULD BE REVERSED

1. The Examiner's Rejection And The Scope And Content Of The Prior Art

Claims 13-14 and 19-20 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong").

Pierce discloses an "essentially boron free filtration media" useful in environments where humidity and temperature are strictly controlled and release of boron-based contaminants cannot be tolerated. *Pierce* at page 2, lines 18-21. The filtration media of Pierce is formed using glass wool fibers and chopped glass fibers in a wet-laid process. *Id.* at page 14, lines 17-26. Only very specialized low-boron or boron-free fibers are used in order to ensure boron-based contaminants are not later released from the filter media in sensitive clean room environments. *Id.* at page 5, lines 3-7 and 22-31.

Dong discloses methods for producing glass mats that are used as reinforcing elements for roofing shingles, flooring, boat hulls, and food service trays. *Dong* at col. 1, lns. 7-17. Dong teaches that the glass mats can be formed using a wet-laid process wherein oppositely charged viscosity modifiers are added during the formation of the glass web in order to provide "control of both the dispersion of glass fibers and subsequent bundling of the fibers...". *Id.* at col. 2, lns. 20-28. "By properly sequencing the addition of the oppositely charged viscosity modifiers, the glass fibers may be dispersed in the white water and then attracted together to form bundles." *Id.* For example, a cationic viscosity modifier can be initially added to the slurry to assist in dispersing the glass fibers throughout. *Id.* at col. 6, lns. 34-37. An oppositely charged, anionic viscosity modifier can then be added to bring the fibers back together in bundles, thereby creating a stronger mat with increased porosity and even weight distribution. *See Dong* at col. 6; lns. 34-37; col. 3, lns. 24-27. Such parameters are desirable in bundled / structured mats used as reinforcing for roofing shingles, etc. *See Dong* at col. 7, lns. 31-43; col. 1, lns. 7-17.

Independent claim 13 recites a filter media that includes a support layer and a filtration layer. The filtration layer includes glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ and the filter media has a gamma value of at least 14.

The Examiner points out that Pierce teaches glass wool fibers having a diameter in the range of 0.1μ to 5.0μ and argues that Pierce also teaches a support layer and a filtration layer because it discloses that the low-boron filtration media can have multiple plies. *Office Action dated 5/16/2008* at 3. The Examiner next argues that, although neither Pierce nor Dong even refers to gamma value, much less teaches a filter media having a gamma value of at least 14, a filter media made from a combination of the processes disclosed in Pierce and Dong would *inherently* have such a gamma value. *Id.* at 3-4 (emphasis added). Specifically, the Examiner argues that "the nonwoven filter media taught by [Pierce] is substantially identical to the claimed nonwoven filter media in structure" and that the wet laid process of Dong is "a substantially identical wet laid process (lowering the pH and then raising the pH)" to one exemplary process disclosed by Appellants as achieving the claimed gamma value. *Id.* at 4. The Examiner argues that the process disclosed in Dong of sequencing the addition of oppositely charged viscosity modifiers to the slurry during formation of the glass web is equivalent to Appellants' process of first adjusting the pH to an acidic level and then subsequently raising the pH to a more alkali level. The Examiner then concludes that "it appears that the nonwoven filter media [made by combining Pierce and Dong] inherently possesses the claimed gamma value." *Id.*

Stated differently, the Examiner argues that it would have been obvious to combine the teachings of Pierce and Dong to improve weight distribution as taught by Dong, and therefore that combining the filter media of Pierce with the pH adjusting process of Dong would result in a filter that inherently possesses a gamma value of at least 14.

The Examiner's rejection should be reversed because 1) the combination of Pierce and Dong does not inherently result in the claimed gamma value, 2) the references teach away from making such a combination, 3) Dong is non-analogous art, and 4) it is improper to rely on an inherent feature of a combination of references to support an obviousness rejection.

2. *The Combination Of Pierce And Dong Does Not Inherently Result In The Claimed Gamma Value.*

The claimed filter media having a gamma value of at least 14 is not an inherent result of combining Pierce and Dong.

The Dong-Pierce combination would not inherently result in a filter media having a gamma value of at least 14 because Pierce uses low-boron glass fibers. As explained above, Pierce's nonwoven filter media are "essentially free of boron." *Pierce* at page 5, lines 5-7. Pierce accomplishes this by using only glass wool fibers and chopped glass fibers that each contain less than 0.2% by weight boron, and preferably contain no detectable level or 0% by weight boron. *Pierce* at page 5, lines 22-31. A Declaration of Wai Ming Choi dated March 14, 2008 ("the Choi III Declaration," attached hereto in Appendix B as Exhibit C) demonstrates that gamma values of at least 14 do not necessarily result when the oppositely charged viscosity modifier teachings of Dong are applied to the low-boron glass fibers of Pierce. *Choi III Declaration* at para. 5; Table B. Rather, the best gamma value Choi, a skilled artisan, could achieve using the teachings of Pierce and Dong was only 13.73. *Id.* at para. 6; Table B. Because gamma value is a logarithmic function, the difference between 13.73 and 14 is substantial, representing a nearly two-fold increase in filtration efficiency. *See Specification* at paras. [0030]-[0031].

The Examiner nonetheless argues that the Choi III Declaration is ineffective to overcome the inherency rejection because "the teachings of the applied prior art are not limited to the 6 examples disclosed in the declaration." *Office Action dated 5/16/2008* at 10. The Examiner in essence argues that other potential experiments based on the teachings of Pierce and Dong might have the claimed gamma value. As explicitly set forth in the MPEP however, "[i]nherency, however, may not be established by probabilities or possibilities. *The mere fact that a certain thing may result from a given set of circumstances is not sufficient.*" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)." MPEP §2112 (IV) (emphasis added). "Probabilities are not sufficient... A prior inherent event cannot be established based upon speculation or where a doubt exists." *Ethyl Molded Products Co. v. Betts Package Inc.*, 9 USPQ2d 1001, 1032-33 (E.D. Ky. 1988)(citing *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981) and *In re Chandler*, 254 F.2d 396 (C.C.P.A. 1958))(emphasis added). The examples in the

Choi III Declaration amply demonstrate that achieving a gamma value of at least 14 from the teachings of Pierce and Dong is speculative at best, if not altogether impossible. Accordingly, the claimed gamma value is not an inherent result of Pierce and Dong and therefore Pierce and Dong are deficient with respect to claim 13.

3. The Examiner Fails To Provide A Proper Rationale To Combine Pierce And Dong

Not only has the Examiner disregarded the deficiencies in Pierce and Dong, but the Examiner has simply failed to provide a valid reason to combine these references. "The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious." MPEP §2141(III). The Supreme Court in *KSR Int'l Corp. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007), quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), stated that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." Here, the only reasoning the Examiner has provided for combining the viscosity modifier process of Dong with the filter media of Pierce is that the resulting filter media would "advantageously possess a uniform weight." *Office Action dated 5/16/2008* at 4.

This argument is flawed however because Pierce already has a uniform weight. Dong requires the use of viscosity modifiers as a dispersant because the structural mats taught therein rely on the use of large filaments of glass which, unlike the relatively small microfibers used in Pierce, have a difficult time dispersing. *See Dong* at col. 3, lns. 32-36 and 55-65; *Pierce* at page 6, lns. 12-18. The longer filaments of Dong have trouble dispersing not only due to their length, but also because they are coated with a sizing agent. *See Dong* at col. 3, ln. 66 – col. 4, ln. 8. The micro-glass fibers used in Pierce have no such sizing agent coating and are much shorter than the filaments in Dong. *See Dong* at col. 3, lns. 32-36 and 55-65; *Pierce* at page 6, lns. 12-18. As a result, they are able to disperse evenly in the slurry without the addition of a viscosity modifier and therefore adding one would have no bearing on the weight uniformity of the Pierce filters. Accordingly, it would have been useless to add the process steps of Dong to Pierce in order to improve weight distribution, as argued by the Examiner, and therefore no motivation existed to combine these references.

Moreover, no skilled artisan would have been motivated to combine Pierce and Dong because there is no teaching in either reference that adjusting the pH has a positive impact on gamma value. In fact, if Dong is construed to teach adjusting the pH, as the Examiner argues, then Dong teaches away from the claimed invention. "When the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *KSR v. Teleflex*, 127 S. Ct. 1727, 1740 (2007) (citing *United States v. Adams*, 383 U.S. 39 (1966)). Dong teaches that "[b]y properly sequencing the addition of the oppositely charged viscosity modifiers, the glass fibers may be dispersed in the white water and then attracted together to form bundles." *Dong* at col. 2, lns. 25-28. Dong also explains that "mats comprising highly dispersed fibers may be produced by limiting the amount of oppositely charged viscosity modifier used" and that "mats comprising larger bundles may be produced by increasing the amount of oppositely charged viscosity modifier used." *Dong* at col. 7, lns. 31-43. In further discussing these mats comprising larger bundles of fibers, Dong states that "[t]hese *bundled* mats, i.e. structured glass mats, generally have a porous structure and a uniform distribution of fiber bundles." *Dong* at col. 7, lns. 31-43 (emphasis added). In other words, Dong teaches that adding a second, anionic viscosity modifier pulls the dispersed fibers back together to form bundles, resulting in a mat with increased porosity (increased open areas between bundles). While increased porosity and dense fiber bundles may be advantageous in Dong, where the glass mats are used in structural applications such as roofing shingles, foam headliners, and food service trays, such a property is not at all desirable in the pleated clean room filters contemplated by Pierce. Instead, Pierce discusses the importance of maintaining a low penetration across the filter, where penetration is defined as:

$$Penetration\ \% = \frac{C}{Co}$$

"where C is the [contaminant] particle concentration after passage through the filter and Co is the [contaminant] particle concentration before passage through the filter." *Pierce* at page 13, lines 7-15. Pierce teaches that "it is desirable that filters, or filter media, be characterized by low penetration across the filter of contaminants to be filtered." *Pierce* at page 13, lines, 7-9. In sum, Pierce strives to keep the penetration low, while the object of Dong's process is to increase penetration.

It would therefore not have been obvious to combine the Dong process of sequencing oppositely charged viscosity modifiers with the Pierce filter materials in an attempt to achieve increased gamma value because Dong explicitly teaches obtaining characteristics that are not desirable with the type of filters disclosed by Pierce.

4. Dong Is Non-Analogous Art That Cannot Be Relied On

Still further, it is inappropriate to rely on Dong at all, as it is non-analogous art. To be analogous, a reference must either be within the field of the inventor's endeavor or be reasonably pertinent to the particular problem with which the inventor was involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986).

First, the Dong disclosure of highly porous bundled mats used in making roofing shingles, flooring, and boat hulls is clearly outside the field of high-performance micro-glass filtration media for use in clean rooms. The mere fact that Dong and the present invention each use wet-laid glass fibers, as suggested by the Examiner, does not render Dong analogous. The Examiner's reliance on such a broad interpretation of the field of Appellant's endeavor is improper. Second, Dong is not reasonably pertinent to the particular problem with which Appellants were involved. The subject of the pending application is filter media having enhanced filtration performance characteristics. *Specification* at para. [0002]. The purpose of Dong on the other hand is not to create filters at all, but rather to perform controlled bundling of glass fibers into highly porous structural materials through the use of oppositely charged viscosity modifiers. *Dong* at Abstract. Dong, seeking to produce structural materials such as roofing and flooring, is not concerned with the materials' performance as a filter, and thus sacrifices filter penetration performance in favor of increased "porosity, tensile strength, and tear strength." *See Dong* at col. 1, lns. 55-57. Increasing the strength and porosity of structural glass mats is a vastly different problem than improving the performance of filter media. A reference is reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). Because Dong is directed to an entirely different purpose than the claimed invention, no inventor would be motivated to consider Dong because it is simply not relevant to solving the purpose of the claimed invention. *See Id.* Accordingly, Dong is non-

analogous art and reliance thereon is inappropriate.

5. *It Is Improper To Rely On An Inherent Feature Of A Combination Of References To Support An Obviousness Rejection*

Finally, while an inherent feature of a *single* reference may be relied upon in making an obviousness rejection (*In re Napier*, 55 F.3d 610, 613 (Fed. Cir. 1995)), an inherent feature of a *combination* of references cannot be relied upon because the presence of the feature would not have been recognized by a person having ordinary skill in the art at the time of invention. *See, e.g., Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991) (extrinsic evidence used to fill a gap in a reference "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it *would be so recognized by persons of ordinary skill*") (emphasis added); *Hitzeman v. Rutter*, 243 F.3d 1345, 1355 (Fed. Cir. 2001); *Turbo Care Div. Of Demag Delaval Turbomachinery Corp. v. General Electric Co.*, 264 F.3d 1111, 1119 (Fed. Cir. 2001).

It is important to distinguish inherent *anticipation* rejections made pursuant to 35 U.S.C. § 102 and inherent *obviousness* rejections under 35 U.S.C. § 103. In *Schering Corp. v. Geneva Pharm. Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003), the Federal Circuit rejected the contention that inherent *anticipation* requires recognition by a person of ordinary skill in the art before the critical date of the invention. *Schering* and its progeny are discussed at length in the *anticipation* portion of the MPEP. *MPEP* §2112(II). In the context of *obviousness* however, such recognition *is* required because §103 only permits rejections where the subject matter "would have been obvious at the time the invention was made." *See* 35 U.S.C. § 103 (2000). "Obviousness cannot be predicated on what is not known at the time an invention is made, *even if the inherency of a certain feature is later established.*" *MPEP* §2141.02 (V) (citing *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993)) (emphasis added). The inherency of a feature must therefore be recognizable at the time of invention in order to be relied upon in making an obviousness rejection. *See id.* Combinations proposed by an Examiner, made with the benefit of hindsight, are merely that – *proposed*. Undisclosed "inherent" properties of a combination that has never actually been made, much less made prior to the time of Appellants invention, would by definition not be apparent or recognizable to a person of ordinary skill in the art at the time of invention. A feature inherent in a combination thus cannot be relied upon in

making an obviousness rejection.[4]

In conclusion, for at least all of the aforementioned reasons, independent claim 13 is not obvious over Pierce and Dong, taken alone or in combination. Dependent claims 14 and 19-20 depend from independent claim 13, and therefore distinguish over Pierce and Dong at least because they depend from claim 13.

C. THE REJECTION OF CLAIMS 16-17 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE, DONG, AND HEAD SHOULD BE REVERSED

1. The Examiner's Rejection And The Scope And Content Of The Prior Art

Claims 16-17 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong") as applied to claims 13-14 and 19-20 above and further in view of U.S. Patent No. 4,102,785 to Head ("Head").

Head provides an "improved disposable filter cartridge designed for flow in the inside-to-outside direction." *Head* at col. 2, lns. 64-66. As shown in Figure 1 of Head, reproduced below, a tubular filter assembly is provided. The assembly (10) includes a perforated metal tube (18) surrounded by a coarse-glass pre-filter mat (16), a porous scrim-woven sheet material (14), and a filter tube wall (18) formed of bonded glass fibers. *Head* at col. 6, lns. 50-68. The entire

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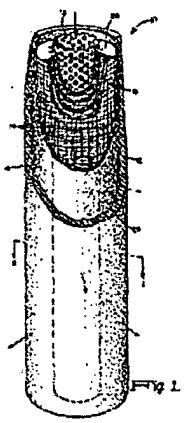
[4] One earlier case implies that such reliance may in fact be permissible. *See In re Roberts*, 470 F.2d 1399 (C.C.P.A. 1973). In *Roberts*, claims directed to a corrugated PET film having a surface coefficient of friction of less than about 0.40 were rejected as being obvious over two references. *Id.* at 1400. The first, a patent to Roberts, taught a corrugated PET film. *Id.* The second, an Australian Patent, taught adding a filler to a non-corrugated film. *Id.* Although the Australian patent provided no purpose for adding the filler, the Appellants' own specification stated that adding a filler is one way of decreasing the surface coefficient of friction of the film. *Id.* The Board affirmed the Examiner's rejection and said, regarding reducing the surface coefficient of friction, that "such result is inherent in the obvious combination of these references." *Id.* at 1400-01. The C.C.P.A. reversed, however, finding that the claimed surface area would not inherently result from the combination of the Roberts film and the Australian Patent's filler because at least some combinations of the two would not result in the claimed coefficient. *Id.* at 1401. Although the rejection was ultimately reversed, the court appears to have impliedly recognized the viability of an obviousness rejection based on inherent features of a combination. *See id.* Appellants contend that, to the extent *Roberts* recognizes such rejections as permissible, it is incorrect and should not be followed.

Two other early cases, *In re Shannon*, 327 F.2d 518 (C.C.P.A. 1964) and *In re Alford*, 300 F.2d 929 (C.C.P.A. 1962), also mention inherent results of a combination. These cases are distinguishable however because in each, the so-called "inherent result" was not actually claimed, but was rather the unexpected result that the Appellant offered as evidence of non-obviousness. *See Shannon* at 520-21; *Alford* at 931-33. Since gamma value, the supposedly inherent feature in the instant case, is explicitly recited in the claims on appeal, *Shannon* and *Alford* do not apply.

assembly is surrounded by an open-cell urethane-foam-coalescent filter (24) and is retained at the ends by an end cap (20). *Id.*



Claim 16 recites the filter media of claim 13, wherein the filter media has an apparent density of at least 0.15 g/cc. Claim 17 recites the filter media of claim 16, wherein the filter media has an apparent density in the range of about 0.15 g/cc to 0.21 g/cc.

The Examiner argues that, while Pierce does not disclose the apparent density of the web, it would have been obvious to look to Head for conventional web densities. In support of this proposition, the Examiner refers to a single passage in Head that states: "[I]n typical filter tubes, the wall thickness would range from about 0.100 to 0.200 inches... with a *fiber* density of about 0.15 to 0.25 grams/cc". *Head* at col. 4, lns. 53-55 (emphasis added).

2. Head Fails To Remedy The Deficiencies Of Pierce And Dong

As explained above with respect to claim 13, from which claims 16 and 17 ultimately depends, Pierce and Dong are deficient because they lack a filter media having the claimed gamma value. Head fails to remedy this deficiency because it too lacks any teaching or suggestion that would lead a skilled artisan to achieve the claimed gamma value of at least 14.

3. Head Fails To Teach The Claimed Apparent Density And Lacks A Teaching As To How The Density Specified Is Achieved

Head further fails to remedy the deficiencies of Pierce and Dong because Head fails to teach the claimed apparent density. The *apparent density* of a *filter media* is not the same as the *fiber density* of the *fibers* used to form the filter media. The apparent density is determined based on the thickness and the basis weight of the resulting filter media, whereas the fiber density is more like the specific gravity of the individual fibers used to form the filter media. Accordingly, Head, which only mentions fiber density in passing and makes no mention whatsoever of the apparent density of the filter, does not remedy the deficiencies of Pierce and Dong.

Moreover, even if Head could somehow be construed to have the claimed apparent density, the apparent density cannot merely be "set" to a specific value as desired. It has to be obtained. Just because one reference was able to obtain a certain density using a given set of materials and processes, does not mean a person having ordinary skill in the art could simply transpose that density to a completely different set of materials and processes. In other words, no skilled artisan could simply rely on Head, or any other reference for that matter, to teach a certain apparent density, and then merely decide that the Pierce filter materials will have that density. To the contrary, they would have to modify the process and/or materials of Pierce based on the teachings of the prior art. The Examiner has failed to explain how Pierce could be modified in view of Head to arrive at the claimed apparent density, much less how it could be done while maintaining a gamma value of at least 14, as also required by claims 16-17. Furthermore, the Examiner has failed to provide any motivation for making such a modification.

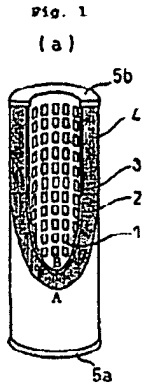
Accordingly, claims 16-17 are not obvious over Pierce, Dong, or Head, taken alone or in combination, and therefore these claims represent allowable subject matter.

D. THE REJECTION OF CLAIM 18 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE, DONG, AND YAMAGUCHI SHOULD BE REVERSED

1. The Examiner's Rejection And The Scope And Content Of The Prior Art

Claim 18 is rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong") as applied to claims 13-14 and 19-20 above and further in view of U.S. Patent No. 6,749,753 to Yamaguchi ("Yamaguchi").

Yamaguchi discloses a multi-layer filter comprised of nonwoven fibrous agglomerates. *Yamaguchi* at col. 2, lns. 28-50. Figure 1 of Yamaguchi, reproduced herein, illustrates a filter assembly that includes a support layer (2), a precision filter layer (3), and a pre-filtration layer (4) disposed around a porous support cylinder (1). *Id.* at col. 9, lns. 17-35. Two end caps (5a, 5b) seal the end portions of the assembly. *Id.*



Claim 18 recites the filter media of claim 14, wherein the glass fibers in the support layer

have a fiber diameter of about 4.2μ and the glass wool fibers that form the filtration layer have a fiber diameter of about 0.69μ. The Examiner concedes that Pierce does not mention using a larger fiber diameter in one of the support plies, and instead relies on Yamaguchi.

2. Yamaguchi Fails To Remedy The Deficiencies Of Pierce And Dong

As explained above with respect to claim 13, from which claim 18 ultimately depends, Pierce and Dong are deficient because they lack a filter media having the claimed gamma value. Yamaguchi fails to remedy this deficiency because it too lacks any teaching or suggestion that would lead a skilled artisan to achieve the claimed gamma value of at least 14.

E. THE REJECTION OF CLAIMS 1-17 AND 19-20 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE, DONG, AND PEREZ SHOULD BE REVERSED

Claims 1-17 and 19-20 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong") and further in view of U.S. Patent No. 6,420,024 to Perez ("Perez").

1. Claims 1-7

a. The Examiner's Rejection And The Scope and Content Of The Prior Art

Independent claim 1 recites a nonwoven filter media that includes at least one glass wool fiber web having a gamma value of at least 14, and a surface area of at least 1.2 m^2/g. In an argument substantially identical to that discussed above for claim 13, the Examiner alleges that Pierce and Dong could be combined to inherently possess the claimed gamma value. Office Action dated 5/16/2008 at 6-7. The Examiner then concedes that Pierce is silent with respect to the claimed surface area but argues that it would have been obvious to look to the prior art for conventional surface areas, and that Perez provides such a conventional teaching. *Id.* at 7.

Perez discloses "highly oriented, melt processed *polymeric* microfibers" and films formed therefrom. *Perez* at col. 1, lns. 66-67; col. 2, lns. 23-25 (emphasis added). The microfibers have an effective average diameter of less than 20 microns and have a substantially *rectangular* cross-section. *Id.* at col. 2, lns. 1-7 (emphasis added). Perez states that "[t]he surface area [of the microfibers] is generally greater than about 0.25 $m^2/gram$, typically about 0.5

to 30 m^2/g." Perez at col. 2, lns. 13-14.

b. None Of The References Teach The Claimed Gamma Value

For the same reasons previously explained in Section VII(B) with regard to independent claim 8, the claimed filter media having a gamma value of at least 14 is not an inherent result of combining Pierce and Dong, and the Examiner has simply failed to provide a valid reason to combine these references. Perez fails to remedy the deficiencies of Pierce and Dong because it too is completely devoid of any teaching of gamma value, much less of how one could modify Pierce and Dong to reach a gamma value of at least 14. Perez is simply relied on to teach fibers having a specified surface area and contains no teachings relating to efficiency. Moreover, as previously explained it is inappropriate to rely on Dong at all, as it is non-analogous art.

c. Perez Cannot Be Combined With Pierce And Dong To Arrive At The Claimed Surface Area

Furthermore, Perez cannot be combined with Pierce and Dong to arrive at the claimed surface area. First, Perez relies on using *polymeric* microfibers having a *rectangular* cross-section to arrive at the disclosed surface area. Pierce on the other hand uses *glass* fibers having a *non-rectangular* cross-section. Therefore, the only way to modify Pierce to arrive at the Perez surface area would be to perform a wholesale replacement of Pierce's round, glass fibers with Perez's rectangular, polymeric fibers. Claim 1, however, expressly requires a *glass* fiber web, thus such a modification would not result in the claimed invention. Second, it would not have been obvious to modify Pierce in view of Perez. Swapping the low-boron glass fibers of Pierce for the polymeric fibers of Perez defeats the entire purpose of the Pierce invention – to provide filters that will not contaminate sensitive areas with boron particles. Third, even if Pierce and Perez could somehow be combined while overcoming these hurdles, the Examiner has not provided any reason why a skilled artisan would do so, or any evidence that such a modification is even possible while also achieving a gamma value of at least 14, as also required by claim 1.

d. Perez Is Non-Analogous Art That Cannot Be Relied On

Finally, it is improper to rely on Perez at all in making an obviousness rejection because Perez is non-analogous art. While both Perez and Appellants were concerned with filters, the Appellants' invention relates to glass micro-fibers, not polymeric fibers as used throughout Perez. As stated above, in order to be analogous, a reference must either be within the field of the inventor's endeavor or be reasonably pertinent to the particular problem with which the inventor was involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986). Charged *polymeric* fibers are not within Appellants field of improving performance of micro-*glass* filters. In addition, Perez is not reasonably pertinent to the particular problem with which Appellants were involved. A reference is reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her problem. *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). An inventor seeking to improve the filtration characteristics of micro-glass filter media would not direct their attention to references that deal exclusively with polymeric fibers because such fibers use completely different manufacturing techniques and have completely different properties than glass. Because Perez is directed to an entirely different field than the claimed invention, no inventor would have been motivated to consider Perez because it is simply not relevant to solving the purpose of the claimed invention. *See Id.* Accordingly, Perez is non-analogous art and reliance thereon is inappropriate.

In sum, for at least the reasons discussed above, independent claim 1 is not obvious over Pierce, Dong, or Perez, taken either alone or in combination. Claims 2-7 distinguish over Pierce, Dong, and Perez at least because they depend from claim 1.

2. Claims 8-12

a. The Examiner's Rejection

Independent claim 8 recites a nonwoven filter media that includes at least one glass fiber web having a gamma value of at least 14, and an apparent density of at least 0.15g/cc. The Examiner offers the same argument as that discussed above with respect to claim 1, specifically that Pierce and Dong could be combined to inherently possess the claimed gamma value. Office

Action dated 5/16/2008 at 6-7. Perez is merely relied on in this rejection to teach "conventional" surface areas, a limitation which is *not* present in any of claims 8-12. *Id.* Rather, with respect to claims 8-12, the Examiner simply concedes that Pierce, Dong, and Perez each lack the claimed apparent density, but argues that the filter media which results from combining these three references would inherently have such an apparent density because the resulting filter media would have an identical surface area and be made from a substantially identical wet laid process. *Id.* at 8.

b. None Of The References, Taken Alone Or Combined, Teach Or Inherently Posses A Gamma Value Of At Least About 14

As explained above with respect to the rejection of claim 13 over Pierce and Dong and with respect to the rejection of claim 1 over Pierce, Dong, and Perez, no combination of Pierce, Dong, and Perez teaches or even inherently possesses a gamma value of at least 14, as required by claim 8. Moreover, even if these references could be construed to teach such a gamma value, there would have been no motivation to combine them, and in fact, Dong teaches away from making such a combination. Accordingly, each of the cited references is deficient with respect to the gamma value limitation of claim 8.

c. None Of The Reference Teach The Claimed Apparent Density

In addition, Pierce, Dong, and Perez are deficient with respect to the claimed apparent density of at least 0.15g/cc. The Examiner argues that the filter media which results from combining these references would *inherently* have the claimed apparent density because the resulting filter media would have an identical surface area and be made from a substantially identical wet laid process. *Office Action dated 5/16/2008* at 8. First, the wet laid processes of these references are not substantially the same as in Appellants' invention. Unlike Appellants, Dong must ensure that its long, surface-coated glass filaments are adequately dispersed and seeks to bundle the filaments for making highly structured, porous mats. *See Dong* at col. 3, lns. 32-36 and 55-65; col. 3, ln. 66 – col. 4, ln. 8. The sequencing of oppositely charged viscosity modifiers used in Dong to accomplish this is not even relevant to, much less "substantially the same as" Appellants' wet laid process as argued by the Examiner.

Second, as discussed above, the surface area disclosed in Perez is achieved by using rectangular, polymeric fibers. *Perez* at col. 1, ln. 66 – col. 2, ln. 22. The Examiner fails to explain how Pierce could be modified to have the same surface area without performing a complete swap of the Pierce non-rectangular glass fibers for the rectangular polymeric fibers of Perez. In addition, there is no explanation as to why a person of ordinary skill would be motivated to make such a combination, nor how such a combination could also achieve the claimed gamma value and still maintain the boron-free properties of Pierce.

Even if one could somehow overcome all of these hurdles to achieve a similar process or similar surface area, there is no evidence that these factors are necessarily correlated to apparent density. The Examiner's unsupported assertion that surface area and process similarities somehow translate into the claimed apparent density does not meet the Examiner's burden to provide "a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." *See Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Interferences, 1990) (emphasis added). Rather, "[t]he doctrine of inherency is available *only* when the prior inherent event can be established as a *certainty*." *Ethyl Molded Products Co. v. Betts Package Inc.*, 9 USPQ2d 1001, 1032-33 (E.D. Ky. 1988)(citing *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981) and *In re Chandler*, 254 F.2d 396 (C.C.P.A. 1958))(emphasis added). "Probabilities are not sufficient... A prior inherent event cannot be established based upon speculation or where a doubt exists." *Id.* The mere possibility that similar surface area or similar process steps *might* lead one to the claimed apparent density is insufficient to establish a rejection based on inherency. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is *necessarily present* in the thing described in the reference, and that *it would be so recognized by persons of ordinary skill.*' ... 'Inherency, however, may not be established by probabilities or possibilities. *The mere fact that a certain thing may result from a given set of circumstances is not sufficient.*" *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (emphasis added).

Accordingly, Pierce, Dong and Perez are each deficient with respect to the claimed gamma value and the claimed apparent density. Claim 8 is therefore not obvious over Pierce,

Dong, or Perez, taken alone or in combination and claims 9-12 are likewise non-obvious at least because they depend from claim 8.

3. Claims 13-17 and 19-20

a. The Examiner's Rejection

Independent claim 13 recites a filter media that includes a support layer and a filtration layer. The filtration layer includes glass wool fibers having a diameter in the range of about 0.1μ to about 4.5μ and the filter media has a gamma value of at least 14. The Examiner argues that the combination of Pierce and Dong would inherently possess the claimed gamma value and that Pierce discloses the use of multiple plies in the filter media. *Office Action dated 5/16/2008* at 6-8.

b. Claims 13-17 and 19-20 Distinguish Over Pierce, Dong, and Perez

It is not specified how Perez is relied upon to reject claim 13, and the inclusion of claims 13-17 and 19-20 in this rejection appears to be in error as Perez is only relied on to teach surface area – a limitation which is not present in independent claim 13. Perez does not contain any teachings that would remedy the deficiencies of Pierce and Dong with respect to the claimed gamma value. Thus, for the same reasons discussed above in Section VII(B) with respect to the rejection of claim 13 over only Pierce and Dong, claim 13 is not obvious over Pierce, Dong, or Perez, taken alone or in combination. Claim 13 thus represents allowable subject matter and claims 14-17 and 19-20 are allowable at least because they depend from an allowable base claim.

F. THE REJECTION OF CLAIM 18 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE, DONG, PEREZ, AND YAMAGUCHI SHOULD BE REVERSED

Claim 18 is rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong") in view of U.S. Patent No. 6,420,024 to Perez ("Perez") as applied to claims 1-17 and 19-20 above and further in view of U.S. Patent No. 6,749,753 to Yamaguchi ("Yamaguchi").

Claim 18 depends from claim 13, and thus for the same reasons discussed in Section VII(D) above with respect to claim 13, Yamaguchi fails to remedy the deficiencies in Pierce and

Dong. Accordingly, claim 18 is not obvious over these references and represents allowable subject matter.

G. THE REJECTION OF CLAIMS 8-12 AND 16-17 PURSUANT TO 35 U.S.C. §103(a) OVER PIERCE, DONG, PEREZ, AND HEAD SHOULD BE REVERSED

Claims 8-12 and 16-17 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over WIPO Published Application No. WO 01/43850 of Pierce et al. ("Pierce") in view of U.S. Patent No. 6,291,552 of Dong ("Dong") in view of U.S. Patent No. 6,420,024 to Perez ("Perez") as applied to claims 1-17 and 19-20 above and further in view of U.S. Patent No. 4,102,785 to Head ("Head").

1. Claims 8-12

a. The Examiner's Rejection

Independent claim 8 recites a nonwoven filter media that includes at least one glass fiber web having a gamma value of at least 14, and an apparent density of at least 0.15g/cc. The Examiner argues that, while Pierce does not disclose the apparent density of the web, Head discloses that "it is known and typical in the filter art to use a fiber density of about 0.15 to 0.25g/cc." *Office Action dated 5/16/2008* at 9. In support of this proposition, the Examiner refers to a single passage in Head that states: "[I]n typical filter tubes, the wall thickness would range from about 0.100 to 0.200 inches... with a *fiber* density of about 0.15 to 0.25 grams/cc". *Head* at col. 4, lns. 53-55 (emphasis added).

b. None Of The References Teach The Claimed Gamma Value

At the outset, the inclusion of Head here appears to be an admission by the Examiner that the Examiner's previous rejection of claims 8-12 over Pierce, Dong, and Perez is insufficient to render claims 8-12 obvious. Regardless, for the same reasons previously explained in Section VII(B) with regard to independent claim 8, the claimed filter media having a gamma value of at least 14 is not an inherent result of combining Pierce and Dong, and the Examiner has simply failed to provide a valid reason to combine these references. Perez does not remedy this deficiency of Pierce and Dong, as explained in Section VII(E)(1) with regard to independent claim 1. Head likewise fails to remedy the deficiencies of Pierce, Dong, and Perez because it too

is completely devoid of any teaching of gamma value, much less of how one could modify Pierce, Dong, and Perez to reach a gamma value of at least 14. Head is simply relied on to teach apparent density and contains no teachings relating to efficiency. Moreover, as previously explained it is inappropriate to rely on Dong and Perez at all, as both references are non-analogous art.

c. None Of The References Teach The Claimed Apparent Density

The Examiner relies on Head to teach the claimed apparent density, however as discussed above with respect to the rejection of claims 16-17 in Section VII(C), Head does not teach apparent density. The *apparent density* of a *filter media* is not the same as the *fiber density* of the *fibers* used to form the filter media. The apparent density is determined based on the thickness and the basis weight of the resulting filter media, whereas the fiber density is more like the specific gravity of the individual fibers used to form the filter media. Accordingly, Head, which only mentions fiber density in passing and makes no mention whatsoever of the apparent density of the filter, does not remedy the deficiencies of Pierce and Dong.

Moreover, as explained above with respect to the rejection of claims 16-17, even if Head could somehow be construed to have the claimed apparent density, the apparent density cannot merely be "set" to a specific value as desired. It has to be obtained. Just because one reference was able to obtain a certain density using a given set of materials and processes, does not mean a person having ordinary skill in the art could simply transpose that density to a completely different set of materials and processes. In other words, no skilled artisan could simply rely on Head, or any other reference for that matter, to teach a certain apparent density, and then merely decide that the Pierce filter materials will have that density. To the contrary, they would have to modify the process and/or materials of Pierce based on the teachings of the prior art. The Examiner has failed to explain how Pierce could be modified in view of Head to arrive at the claimed apparent density, much less how it could be done while maintaining a gamma value of at least 14, as also required by claim 8. Furthermore, the Examiner has failed to provide any motivation for making such a modification.

Accordingly, independent claim 8 is not obvious over Pierce, Dong, Perez, or Head, taken alone or in combination, and therefore claim 8 represents allowable subject matter. Claims

9-12 are allowable at least because they depend from an allowable base claim.

2. Claims 16-17

a. The Examiner's Rejection

Claim 16 recites the filter media of claim 13, wherein the filter media has an apparent density of at least 0.15g/cc. Claim 17 recites the filter media of claim 16, wherein the filter media has an apparent density in the range of about 0.15g/cc to 0.21g/cc. Claims 16 and 17 both depend ultimately from independent claim 13, which requires a filter media having a gamma value of at least 14. The Examiner argues that the combination of Pierce and Dong would inherently possess such a gamma value and that Head discloses "that it is known and typical in the filter art to use a fiber density of about 0.15 to 0.25 g/cc." *Office Action dated 5/16/2008* at 9.

b. The Combination Of Pierce, Dong, Perez, And Head Does Not Result In A Filter Media Having The Claimed Apparent Density

For the same reasons discussed above with respect to claims 8-12, the Examiner's reliance on Head does nothing to resolve the deficiencies in Pierce and Dong with respect to gamma value, nor does it teach how the claimed apparent density can be achieved since it simply lacks any teachings relating to apparent density.

Accordingly, claims 16-17 are not obvious over Pierce, Dong, Perez, or Head, taken alone or in combination, and therefore these claims represent allowable subject matter.

VIII. CONCLUSION

For the reasons noted above, Appellants submit that the pending claims define patentable subject matter. Accordingly, Appellants request that the Examiner's rejection of these claims be reversed and that the pending application be passed to issue/

Respectfully submitted,

Dated: April 28, 2009

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APPENDIX A: CLAIMS ON APPEAL

1. (Previously Presented) A nonwoven filter media, comprising at least one glass wool fiber web having a gamma value of at least 14, and a surface area of at least 1.2 m^2/g.

2. (Original) The nonwoven filter media of claim 1, wherein the glass wool fiber web is formed from glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ.

3. (Original) The nonwoven filter media of claim 2, wherein the glass wool fibers have a diameter selected from the group consisting of about 0.69μ and about 4.5μ.

4. (Original) The nonwoven filter media of claim 1, further comprising chopped glass fibers combined with the glass wool fibers.

5. (Original) The nonwoven filter media of claim 4, wherein the glass wool fibers and the chopped glass fibers form a filtration layer.

6. (Original) The nonwoven filter media of claim 5, wherein glass wool fibers are present in the filtration layer in the range of about 70% to 99% by weight and the chopped glass fibers are present in the filtration layer in the range of about 1% to 30% by weight.

7. (Original) The nonwoven filter media of claim 1, wherein the filter media is a wet laid filter media.

8. (Previously Presented) A nonwoven filter media, comprising at least one glass fiber web having a gamma value of at least 14, and an apparent density of at least 0.15 g/cc.

9. (Original) The nonwoven filter media of claim 8, wherein the at least one glass fiber web includes glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ.

10. (Original) The nonwoven filter media of claim 9, wherein the glass wool fibers have a diameter of about 0.69μ.

11. (Original) The nonwoven filter media of claim 8, wherein the filter media is a wet laid filter media.

12. (Original) The nonwoven filter media of claim 8, wherein the apparent density is in the range of about 0.15 g/cc to 0.21 g/cc.

13. (Previously Presented) A filter media, comprising:

a support layer; and

a filtration layer including glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ;

wherein the filter media has a gamma value of at least 14.

14. (Original) The filter media of claim 13, wherein the support layer includes glass fibers having a diameter in the range of about 4μ to 30μ.

15. (Previously Presented) The filter media of claim 13, wherein the filter media has a surface area of at least 1.2 m^2/g.

16. (Previously Presented) The filter media of claim 13, wherein the filter media has an apparent density of at least 0.15 g/cc.

17. (Original) The filter media of claim 16, wherein the filter media has an apparent density in the range of about 0.15 g/cc to 0.21 g/cc.

18. (Original) The filter media of claim 14, wherein the glass fibers in the support layer have a fiber diameter of about 4.2μ and the glass wool fibers that form the filtration layer have a fiber diameter of about 0.69μ.

19. (Original) The filter media of claim 13, wherein the filtration layer further includes chopped glass fibers combined with the glass wool fibers.

20. (Original) The filter media of claim 19, wherein the glass wool fibers are present in the filtration layer in the range of about 70% to 99% by weight and the chopped glass fibers are present in the filtration layer in the range of about 1% to 30% by weight.

21-30. (Cancelled).

APPENDIX B: EVIDENCE

Exhibit A

Declaration of Wai Ming Choi (submitted and entered into file history on March 7, 2007 pursuant to 37 C.F.R. §1.132)

Exhibit B

Declaration of Wai Ming Choi (submitted and entered into file history on October 4, 2007 pursuant to 37 C.F.R. §1.132)

Exhibit C

Declaration of Wai Ming Choi (submitted and entered into file history on March 14, 2008 pursuant to 37 C.F.R. §1.132)

EXHIBIT A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Wai Ming Choi	
Application No.:	10/822,440	Conf. #: 1434
Filed:	April 12, 2004	Group Art Unit: 1771
Entitled:	LOW DENSITY NONWOVEN GLASS FIBER WEB	Examiner: Andrew T. Piziali
Docket No.:	72545-83	

Certificate of Mailing (37 C.F.R. 1.8(a))

I hereby certify that this correspondence is being electronically filed via EFS-Web with the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date set forth below.

March 7, 2007 — Date of Signature and Mail Deposit

By: [signature] — Lisa Adams, Reg. No: 44,238, Attorney for Applicant(s)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

1.132 Declaration of Wai Ming Choi

I, Wai Ming Choi, residing at 1569 Commonwealth Ave, West Newton, Massachusetts, hereby declare as follows:

1. I am a Chief Scientist at Hollingsworth & Vose Company, and my responsibilities include high efficiency glass fiber media development. I have been working at Hollingsworth & Vose Company for 14 years and I have been developing glass filter media grades for over 10 years.

2. I obtained a Master of Science degree in Chemical Engineering.

3. I have read the above-referenced application, and I fully understand the materials disclosed and claimed therein.

4. The above-referenced patent application is directed to a nonwoven filter media

formed from glass wool fibers having a gamma value of at least about 14.

5. In the course of the research that resulted in the invention described and claimed in the above-referenced patent application, I set out to develop a glass filter media having a high gamma value. I prepared filter media using glass wool fibers, however when tested these filter media had gamma values of about 12-13. I unexpectedly discovered that adjusting the pH from an acidic pH to a neutral pH during formation of the filter media resulted in a filter media having a gamma value of at least about 14. In particular, the pH is adjusted by first adding an acidic agent to a slurry containing glass wool fibers, since glass wool fibers are anionic by nature. The acidic pH is then adjusted by adding a neutral or alkaline pH adjusting agent to the slurry to bring the pH to a range of about 6 to 12. I discovered that this additional step of adding a neutral or alkaline pH adjusting agent to the slurry unexpectedly produces a nonwoven glass web having improved filtration properties, and in particular having a gamma value of at least about 14.

6. Example 1 of the pending application illustrates the effects of adjusting the pH during formation of the filter media. As explained in paragraph [0034] of the pending application, a slurry was prepared containing a mixture of glass fibers, and the pH of the slurry was adjusted to a range of about 2.3 to 3.8. Three samples of fiber web were collected at a pH of 2.3, 3.6, and 3.8. The experiment was repeated containing the same fiber mixture, however the pH was adjusted to a range of between 4.3 and 10.3. Samples were collected at pH's ranging from 4.2 up to 10.4. The results are set forth in Table 1 of the specification. As shown, the samples collected at an acidic pH (i.e., samples 2.3, 3.6, 3.8, and 4.2) that was *not adjusted* have a gamma value of about 13. Conversely, the samples collected at a neutral pH (i.e., 6.7, 7.0, 8.0, 8.4, 9.2, 9.6, and 10.4) that was adjusted from an initial acidic pH have a gamma value that is 14 or greater. Thus, adjusting the pH of the slurry from an acidic pH to a neutral pH clearly improves the gamma value of the resulting filter media. Table 1 also shows a significant improvement in the apparent density and the surface area of the filter media as a direct result of adjusting the pH of the slurry.

7. The following Example A further proves that a gamma value of at least about 14 can only be obtained by adjusting the pH of the slurry first to an acidic pH, and then to a neutral

or alkaline pH.

Example A

A slurry was prepared containing 50 lbs. of Evanite 706X fiber having an average fiber diameter of about 0.69μ, 30 lbs. of Evanite 312X[1] fiber having an average fiber diameter of about 4.2μ, 3 lbs. of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.25 inches, and 3 lbs. of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.5 inches. The slurry contained water and sulfuric acid sufficient to yield a fiber concentration of 0.75% by weight. Samples were collected and the properties of each sample were tested and are shown in the chart below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

DOP (%)	Resistance (mm H_2O)	Ream Weight lbs	Caliper (mm@ 5Kpa)	Surface Area (sq m/g)	Gamma (100P)	pH Corning Model 430	pH indicator paper colorpHast 2.0-9.0
0.0024	35.9	47.08	0.453	n/a	12.87	5.67	5.5
0.0012	36.0	46.45	0.474	1.816	13.67	n/a	n/a
0.0017	35.6	46.06	0.458	n/a	13.40	n/a	n/a
0.0026	35.5	46.29	n/a	n/a	12.92	n/a	n/a
0.0013	36.0	n/a	n/a	n/a	13.57	n/a	n/a
0.0006	39.0	49.85	0.487	1.8101	13.39	5.73	5.0
0.0008	39.8	50.01	0.487	n/a	12.81	n/a	n/a
0.0021	39.5	50.40	0.482	n/a	11.84	n/a	n/a
0.0019	40.0	49.30	n/a	n/a	11.80	n/a	n/a
0.0014	37.4	47.16	0.464	n/a	12.98	5.55	5.5
0.0014	37.6	47.32	0.462	n/a	12.91	n/a	n/a
0.0021	36.9	47.32	0.458	n/a	12.68	n/a	n/a
0.0021	37.5	47.01	n/a	n/a	12.47	n/a	n/a

1 Applicant notes that Evanite 712X used in Applicant's original experiments is no longer available, but is substantially identical to Evanite 312X. Evanite 712X had an average fiber diameter of 4.2 microns, whereas Evanite 312X has an average fiber diameter of 3.9 microns. This different is insubstantial and does not affect the outcome of the test results.

As shown, all samples have a Gamma in the range of about 11 to 13. When compared to Example 1 in the pending application, the above Example A illustrates that adjusting the pH of the slurry during formation of a glass wool fiber web is directly responsible for producing a filter media having a gamma value of at least about 14.

8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3/7/2007

Wai Ming Choi

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Wai Ming Choi	
Application No.:	10/822,440	Conf. #: 1434
Filed:	April 12, 2004	Group Art Unit: 1771
Entitled:	LOW DENSITY NONWOVEN GLASS FIBER WEB	Examiner: Andrew T. Piziali
Docket No.:	72545-83	

Certificate of Mailing (37 C.F.R. 1.8(a))

I hereby certify that this correspondence is being electronically filed via EFS-Web with the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date set forth below.

Oct. 4, 2007 — Date of Signature and Mail Deposit

By: — Lisa Adams, Reg. No. 44,238, Attorney for Applicant(s)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

§1.132 Declaration of Wai Ming Choi

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3. I have read the above-referenced application, and I fully understand the materials disclosed and claimed therein.

4. The above-referenced patent application is directed to a nonwoven filter media formed from glass wool fibers having a gamma value of at least about 14.

5. In the course of the research that resulted in the invention described and claimed in the above-referenced patent application, I set out to develop a glass filter media having a high gamma value. I prepared filter media using glass wool fibers, however when tested these filter media had gamma values of about 12-13. I unexpectedly discovered that adjusting the pH to an acidic pH, and then to a neutral pH during formation of the filter media resulted in a filter media having a gamma value of at least about 14, as explained in paragraphs 0023 and 0024 of the present application. In particular, the pH is adjusted by first adding an acidic agent to a slurry containing glass wool fibers, since glass wool fibers are anionic by nature. The acidic slurry is then adjusted by adding a neutral or alkaline pH adjusting agent to the slurry to bring the pH to a range of about 6 to 12. I discovered that this additional step of adding a neutral or alkaline pH adjusting agent to an acidic slurry unexpectedly produces a nonwoven glass web having improved filtration properties, and in particular having a gamma value of at least about 14.

6. The following examples prove that a gamma value of at least about 14 can only be obtained by performing two steps: (1) adjusting the pH of the slurry first to an acidic pH, and (2) then adjusting the pH to a neutral or alkaline pH.

Example A: No pH Adjusting Agents

Samples A1, A2, A3, A4, A5, and A6 are formed using the following process.

Water having a pH of about 6.0 is added to a Waring blender (which is equivalent to a pulper on a paper machine). Sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table A below as the "Blender pH." 4.18 grams Evanite 706X fiber having an average fiber diameter of about 0.69μ, 2.52 grams of Evanite 312X fiber having an average fiber diameter of about 4.2μ, 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.25 inches, and 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.5 inches are added to the blender and dispersed into a slurry. Water is added to a handsheet mold (equivalent to white

water tank during papermaking process), and the pH of the water is measured and recorded in Table A below as the "Mold pH." The slurry from the blender is added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the water with the glass fiber slurry in the handsheet mold is measured and recorded in Table A below as the "Mold pH with Fiber Slurry" (this pH is equivalent to the pH in the headbox of the paper machine). The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table A below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

Table A

Sample:	A1	A2	A3	A4	A5	A6
Blender pH	1.8	2	2.4	2.5	2.8	2.8
Mold pH with Water	6	6	6	6	6	6
Mold pH with Fiber Slurry	3.1	2.9	5.8	5.8	6.1	6.1
Basis Weight of Filter Media (g/m^2)	73.9	73.7	75.5	73.9	75.4	74.1
Filter Media Caliper (mm)	0.3175	0.41402	0.45466	0.43942	0.47752	0.44958
Filter Media Apparent Density (m2/g)	0.232756	0.178011	0.166058	0.168176	0.157899	0.16482
Filter Media Surface Area (m2/g)	1.5879	1.6585	1.6744	1.7911	1.7609	1.869
DOP Penetration (%)	0.027	0.022	0.009	0.0094	0.0036	0.0045
Air Resistance	26.4	27.4	28.8	29	30.8	31.3
Gamma	13.52	13.35	14.05	13.89	14.43	13.89

Example B: Acid Only

Samples B1, B2, B3, B4, B5, B6, B7, and B8 are formed using the following process.

Water having a pH of about 6.0 is added to a Waring blender. Sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table B below as the "Blender pH." 4.18 grams Evanite 706X fiber having an average fiber diameter of about

0.69μ, 2.52 grams of Evanite 312X fiber having an average fiber diameter of about 4.2μ, 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.25 inches, and 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.5 inches are added to the blender and dispersed into a slurry. Water is added to a handsheet mold (equivalent to white water tank during papermaking process), and sulfuric acid is added to the handsheet mold to adjust the pH, which is measured and recorded in Table B below as the "Acid Adjusted Mold pH with Water." The slurry from the blender is added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the slurry in the handsheet mold is measured and recorded in Table B below as the "Mold pH with Fiber Slurry." The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table B below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

Table B

Sample:	B1	B2	B3	B4	B5	B6	B7	B8
Blender pH	2.1	2	2.1	2.1	2.1	2.1	2	2.1
Acid Adjusted Mold pH with Water	2.4	2.4	3.1	3.3	4.2	4.2	5.3	5.2
Mold pH with Fiber Slurry	2.3	2.4	2.8	2.9	2.9	3.0	3.1	3.0
Basis Weight of Filter Media (g/m^2)	74	73.7	73.7	74.8	74.8	73.7	72.1	73.7
Filter Media Caliper (mm)	0.41402	0.40894	0.40132	0.41656	0.42418	0.42164	0.40386	0.41402
Filter Media Apparent Density (m2/g)	0.178735	0.180222	0.183644	0.179566	0.17634	0.174794	0.178527	0.178011
Filter Media Surface Area (m2/g)	1.7181	1.7905	1.7921	1.7650	1.7902	1.6750	1.6689	1.7488
DOP Penetration (%)	0.047	0.06	0.019	0.022	0.024	0.027	0.038	0.023
Air Resistance	26	25.1	27.9	27.5	26.9	26.5	26	27.3
Gamma	12.8	12.84	13.34	13.3	13.46	13.47	13.15	13.33

Example C: Base Only

Samples C1, C2, C3, C4, C5, and C6 are formed using the following process.

Water having a pH of about 6.0 is added to a Waring blender. Sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table C below as the "Blender pH." 4.18 grams Evanite 706X fiber having an average fiber diameter of about 0.69μ, 2.52 grams of Evanite 312X fiber having an average fiber diameter of about 4.2μ, 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.25 inches, and 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.5 inches are added to the blender and dispersed into a slurry. Water is added to a handsheet mold (equivalent to white water tank during papermaking process), and ammonium hydroxide is then added to the handsheet mold to adjust the pH, which is measured and recorded in Table C below as the "Base Adjusted Mold pH." The slurry from the blender is then added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the slurry in the handsheet mold is measured and recorded in Table C below as the "Mold pH with Fiber Slurry." The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table C below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

Table C

Sample:	C1	C2	C3	C3	C5	C6
Blender pH	2.5	2.3	2.5	2.5	2.4	2.4
Base Adjusted Mold pH with Water	7.1	6.9	8.0	8.1	9.0	9.0
Mold pH with Fiber Slurry	6.6	6.6	6.9	7.0	8.6	8.8
Basis Weight of Filter Media (g/m^2)	74.7	74.4	75.4	75.5	76.7	74.7
Filter Media Caliper (mm)	0.4699	0.45466	0.45974	0.4953	0.55372	0.54102
Filter Media Apparent Density (m2/g)	0.15897	0.163639	0.164006	0.152433	0.138518	0.138073
Filter Media Surface Area (m2/g)	1.8135	2.1247	1.8077	1.9059	1.8421	1.5920
DOP Penetration (%)	0.002	0.0037	0.0036	0.0029	0.0029	0.0015
Air Resistance	32.5	31.4	32.4	32.5	33.8	32.3
Gamma	14.46	14.11	13.72	13.96	13.42	14.93

Example D: Acid and Base

Samples D1, D2, D3, D4, D5, and D6 are formed using the following process.

Water having a pH of about 6.0 is added to a Waring blender. Sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table D below as the "Blender pH." 4.18 grams Evanite 706X fiber having an average fiber diameter of about 0.69μ, 2.52 grams of Evanite 312X fiber having an average fiber diameter of about 4.2μ, 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.25 inches, and 0.25 grams of Owens-Corning Chopped Glass fiber DE having an average fiber length of about 0.5 inches are added to the blender and dispersed into a slurry. Water is added to a handsheet mold (equivalent to white water tank during papermaking process), and sulfuric acid is added to the handsheet mold to adjust the pH, which is measured and recorded in Table D below as the "Acid Adjusted Mold pH with Water." Ammonium hydroxide is then added to the handsheet mold to adjust the pH, which is measured and recorded in Table D below as the "Acid/Base Adjusted Mold pH with Water." The slurry from the blender is then added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the slurry in the handsheet mold is

measured and recorded in Table D below as the "Mold pH with Fiber Slurry." The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table D below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

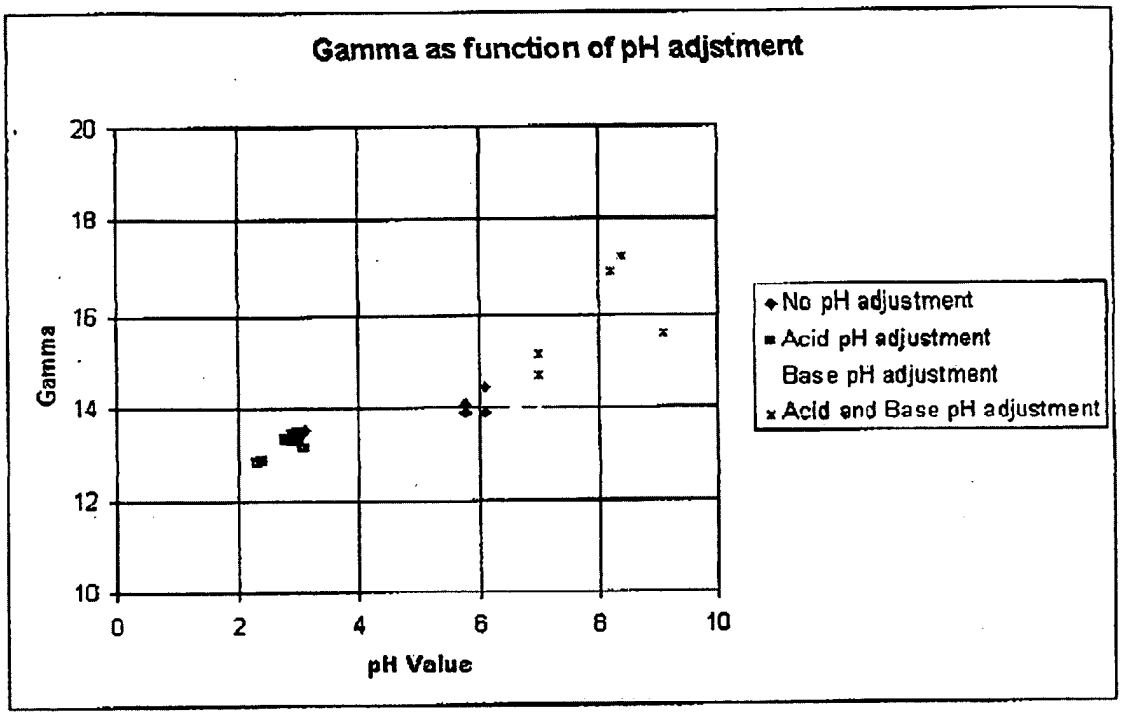
Table D

Sample:	D1	D2	D3	D4	D5	D6
Blender pH	2.4	2.4	2.4	2.5	2.4	2.4
Acid Adjusted Mold pH with Water	2.4	2.4	2.4	2.5	2.4	2.4
Acid/Base Adjusted Mold pH with Water	7.9	7.4	9	8.7	9	9.2
Mold pH with Fiber Slurry	7	7	8.2	8.4	8.9	9.1
Basis Weight of Filter Media (g/m^2)	74.5	76	75.4	76	76	76
Filter Media Caliper (mm)	0.48006	0.48514	0.52832	0.55118	0.54864	0.6096
Filter Media Apparent Density (m2/g)	0.155189	0.156656	0.142717	0.137886	0.138524	0.124672
Filter Media Surface Area (m2/g)	1.9521	2.009	1.8312	1.8009	1.9538	1.7098
DOP Penetration (%)	0.0048	0.003	0.0008	0.0007	0	0.0029
Air Resistance	29.4	29.9	30.2	29.9	31.1	29.1
Gamma	14.69	15.13	16.88	17.24		15.59

7. Figure 1 below shows the Gamma of the various filter media formed according to Samples A-D. As is clearly shown, the filter media formed accordingly to Sample D, which represent the claimed invention, have a much higher Gamma value than the filter media formed according to Samples A, B, and C. Thus, adjusting the pH of the slurry first to an acidic pH and then to a neutral pH clearly improves the gamma value of the resulting filter media. Sample D also shows a significant improvement in the apparent density and the surface area of the filter media as a direct result of adjusting the pH of the slurry first to acidic then to basic, as compared

to Examples A, B, and C.

Figure 1



8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 10/4/2007

Wai Ming Choi

1655058.1

EXHIBIT C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Wai Ming Choi	
Application No.:	10/822,440	Conf. #: 1434
Filed:	April 12, 2004	Group Art Unit: 1771
Entitled:	LOW DENSITY NONWOVEN GLASS FIBER WEB	Examiner: Andrew T. Piziali
Docket No.:	72545-83	

Certificate of Mailing (37 C.F.R. 1.8(a))

I hereby certify that this correspondence is being electronically filed via EFS-Web with the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date set forth below.

March 14, 2008
Date of Signature and Mail Deposit

By: _____
Lisa Adams, Reg. No: 44,238, Attorney for Applicant(s)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

§1.132 Declaration of Wai Ming Choi

I, Wai Ming Choi, residing at 1569 Commonwealth Ave, West Newton, Massachusetts, hereby declare as follows:

1. I am a Chief Scientist at Hollingsworth & Vose Company, and my responsibilities include high efficiency glass fiber media development. I have been working at Hollingsworth & Vose Company for 14 years and I have been developing glass filter media grades for over 10 years. I obtained a Master of Science degree in Chemical Engineering.

2. I have read the above-referenced application, and I fully understand the materials disclosed and claimed therein. The above-referenced patent application is directed to a nonwoven filter media formed from glass wool fibers having a gamma value of at least about 14.

3. I have read and fully understand WO 01/43850 entitled "Low Boron Containing

Microfiberglass Filtration Media" of Pierce (hereinafter "Pierce"), which is directed to nonwoven glass composites formed from an essentially boron free glass wool and an essentially boron free glass fiber.

4. I understand that the Examiner in the above-referenced application is asserting that the glass wool fiber disclosed in WO 01/43850 would inherently have a gamma value of at least 14 *if* the pH of the slurry used to form a filter media containing the low boron glass wool fibers was adjusted to a neutral or alkaline pH, as taught by U.S. Patent No. 6,291,552 to Dong or U.S. Patent No. 4,523,995 to Pall.

5. Example A below illustrates that the glass wool fibers and chopped glass fibers disclosed in Pierce will *not* produce a filter media having a gamma value of at least 14, without any pH adjusting agent. Example B below illustrates that, even if the pH of the slurry used to form the filter media is adjusted to a neutral or alkaline pH, as supposedly taught by Dong or Pall, the resulting filter media still will not have a gamma value of at least 14. Both Examples A and B were conducted using the low boron glass wool fibers and chopped glass fibers disclosed by Pierce. In particular, pg. 6, lines 5-9 of Pierce states that "'essentially boron free' glass wool fibers useful in the nonwoven composites of the of the present invention are available from Evanite Fiber Corporation, (1551 S.E. Crystal Lake Drive, Post Office Box E, Corvallis, Oregon 97339-0598, product numbers 800 series), Lauscha Fiber International, GmbH, (Dammweg 35, 98724 Lauscha Germany, Product A glass, also 105 Eastport Lane Summerville, South Carolina, 29483) . . . ." Examples A and B below use an Evanite 806 and 804 fiber from the 800 fiber series, and a Lauscha A04F-type A glass. The experiments were performed using the method disclosed at pg. 15, line to pg. 16, line 2 of Pierce (with modifications as indicated above to add a base)

Example A

Water having a pH of about 6.0 is added to a Waring blender (which is equivalent to a pulper on a paper machine). 1 ml of sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table A below as the "Blender pH." The following low boron glass wool fibers are added to the blender and dispersed into a slurry: 1.97

grams (23.8%) of OC Advantex having an average fiber length of 0.25 inches; 0.29 g (4.0%) of Evanite 804; 2.07 g (28.8%) of Lauscha A04F; 1.15 g (16%) of Evanite 806; and 1.97 g (27.4%) of Lauscha A26F. Water is added to a handsheet mold (equivalent to white water tank during papermaking process), and the pH is measured and recorded in Table A below as the "mold pH." The slurry from the blender is then added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the slurry in the handsheet mold is measured and recorded in Table A below as the "Final pH in mold." The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table A below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

Table A

	A1	A2
Blender pH	2.5	2.5
Mold pH	5.5	5.5
Final pH in mold	5.5	5.5
Basis Weight (gsm)	75.7	74.7
Caliper @10Kpa (mm)	0.438	0.441
Density (g/c.c.)	0.173	0.169
100P DOP (%pen)	0.018	0.024
Air Resistance	28.1	26.7
Gamma	13.33	13.56
Surface Area (m^2/g)	2.0054	1.8684

Example B

Water having a pH of about 6.0 is added to a Waring blender (which is equivalent to a pulper on a paper machine). 1 ml of sulfuric acid (necessary for fiber dispersion) is added to the Waring blender. The pH is measured and recorded in Table A below as the "Blender pH." The following low boron glass wool fibers are added to the blender and dispersed into a slurry: 1.97 grams (23.8%) of OC Advantex having an average fiber length of 0.25 inches; 0.29 g (4.0%) of Evanite 804; 2.07 g (28.8%) of Lauscha A04F; 1.15 g (16%) of Evanite 806; and 1.97 g (27.4%)

of Lauscha A26F. Water is added to a handsheet mold (equivalent to white water tank during papermaking process), and ammonium hydroxide is then added to the handsheet mold to adjust the pH. The amount of ammonium hydroxide added to the handsheet mold is recorded in Table B as "Amt. NH4OH added to mold," and the pH is measured and recorded in Table B below as the "mold pH." The slurry from the blender is then added to the handsheet mold (equivalent to white water and fiber slurry being pumped into the headbox during the papermaking process), and the final pH of the slurry in the handsheet mold is measured and recorded in Table B below as the "Final pH in mold." The water from the handsheet mold is drained through a screen at the bottom of the mold. After the water is removed, a filter media is formed on top of the screen. The filter media is dried on a photo dryer to form a final filter media. The properties of each sample were tested and are shown in Table B below. All tests were conducted at an air velocity of 5.33 cm/sec with a DOP particle size of 0.3 microns.

Table B

	B1	B2	B3	B4	B5	B6
Blender pH	2.5	2.5	2.5	2.5	.2.5	2.5
Amt NH_4OH added to mold	2.5 ml	2.5 ml	4 ml	4 ml	6 ml	6 ml
Mold pH	8.0	8.0	8.7	9.0	10.0	10.0
Final pH in mold	7.0	7.0	8.0	8.0	9.0	9.0
Basis Weight (gsm)	74.9	75.8	75.7	75.2	75.7	75.8
Caliper @10Kpa (mm)	0.473	0.477	0.582	0.495	0.600	0.538
Density (g/c.c.)	0.158	0.159	0.130	0.152	0.126	0.141
100P DOP (%pen)	0.016	0.013	0.020	0.012	0.023	0.016
Air Resistance	28.3	28.4	27.3	28.8	26.5	27.7
Gamma	13.41	13.68	13.55	13.61	13.73	13.70
Surface Area (m^2/g)	1.8931	1.8278	1.8319	1.8558	2.0461	1.9337

6. As illustrated above, neither Example A nor Example B produces a filter media having a gamma value that is at least 14. All gamma values are less than 14. While some of the results show a gamma as high as 13.73, this is a significant difference when referring to filtration efficiency. Accordingly, Pierce alone, or Pierce modified in view of Pall or Dong, will not inherently have the claimed gamma value.

7. I further declare that all statements made herein of my own knowledge are true

and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3/14/2008

Wai Ming Choi

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APPENDIX C: RELATED PROCEEDINGS

None.

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